

NATURAL RESOURCES CONSERVATION SERVICE  
MONTANA CONSERVATION PRACTICE SPECIFICATION**PEST MANAGEMENT (ACRE)****PRECISION AGRICULTURE****CODE 595**

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PRODUCER

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TRACT. / FIELD NO. / CTU

**DEFINITION:** Utilizing environmentally sensitive prevention, avoidance, monitoring and suppression strategies, to manage weeds, insects, diseases, animals, and other organisms (including invasive and non-invasive species) that directly or indirectly cause damage or annoyance.

**PURPOSE:** Precision pest management is the process where the best available technologies are used to vary crop management to fit specific conditions found in a small unit area within a larger management unit that may be used to more precisely evaluate input production factors to more accurately enhance the quality and quantity of crops and forages and to minimize negative impacts on soil, water, air, plant, animal and human resources.

**CONSERVATION MANAGEMENT SYSTEMS**

Pest management is a component of a conservation management system. It is used in conjunction with crop rotation, residue management, nutrient management, conservation buffer practices, waste utilizations, and/or other practices needed on a site-specific basis to address natural resource concerns and producer objectives. The major role of precision pest management is to optimize inputs thus protecting surface and ground water supplies while enhancing quantity and quality of commodities.

**PRECISION PEST MANAGEMENT PLANNING**

A precision pest management plan is a dynamic tool and must be monitored and adjusted annually. An effective pest management program will usually include more than one control method. Consideration of the impacts of mechanical, biological, and cultural controls should be considered before relying on chemical controls. Avoid routine preventative pest control measures. Utilize spot treatments whenever practical.

A precision pest management plan must:

- Identify within field variability
- Include field scouting and digitally recording pest concentrations within a management zone
- Consider economic thresholds
- Identify alternative control methods
- Conduct cost and return assessment of variable and fixed costs of alternatives for each management zone
- Consider risk management (WIN\_PST)
- Detect other pest management/control problems where applicable.
- Annually monitor pests

Equipment - GPS (Global Positioning System) is an integral part of precision pest management. The GPS unit utilized for precision pest management should include differential correction for position information during data collection, data logging, and harvest. Precision pest management results must be correlated annually by contrasting controls with quantity and/or quality of commodities by:

## Specification MT595A-2

- Flow sensors to document grain flow rate at harvest
- Moisture sensor to measure grain/forage or other product moisture
- Speed sensor (speedometer) to determine the speed at which the combine is operating
- Header position switch to control yield monitor data logging
- Memory card with data output capability.

Yield/forage Monitor Calibration - Yield or forage monitor must be calibrated according to the manufacturer's specification.

Alternative's Narrative - An alternative's narrative is required in all pest management plans. The alternative's narrative identifies resource concerns and provides an explanation of potential hazards caused by the interaction of soil and pesticides. The alternative's narrative also provides alternatives to treating pest problems. The producer-selected alternatives are then documented on the pest management job sheet.

Mitigation Practices - Where risk analysis tools identify intermediate/high potential hazards to humans or fish, mitigation practices that serve to minimize those risks are required to ensure the protection of water resources. Minimizing groundwater contamination by leaching of a pesticide or associated metabolites are those practices that reduce or eliminate exposure or infiltration. Examples of these practices include reduced rates, foliar applications, alternative pesticides, and alternative controls. Mitigation practices for limiting surface water contamination by runoff of a pesticide or associated metabolite (including runoff of soil adsorbed pesticides) are those practices that minimize water runoff and soil erosion.

## BASIC COMPONENTS OF PRECISION PEST MANAGEMENT

Setting up Pest Management Zones - Current multi-spectral satellite imagery or aerial ortho-photography can be used. Current imagery means data that is no more than three years old. Multi-spectral satellite imagery should have a spatial resolution no greater than 30 meters and at a minimum must have spectral data from the red and near-infrared bands. Aerial ortho-photography should have a spatial resolution no greater than five meters and must be displayed as natural color or color infrared. Imagery with dates corresponding to seasons of drought or extreme moisture should be avoided. Using image analysis software or photo interpretation, evaluate imagery for information representing variations in crop vigor and crop production due to pest infestations, pest populations, etc.

Zone Pest Scouting - Complete **pest scouting** by recording applicable pest, infestation degree, growth stage, etc. Scouting should be completed on a grid basis for complete coverage and electronically recorded with a GPS unit.

Pest Map Development - Areas or points of pest infestations should be displayed and evaluated with the digital imagery to identify similar image data patterns representing areas of pest infestations. This information is then used to delineate zones for treatment. Manually or electronically delineate initial management zones or point locations for pest control applications and transfer the delineations or point locations into the application equipment software.

Pest Map Interpretation - Identify pest variability within a management zone. Onsite ground truthing may be necessary. Refine and modify management zones as needed prior to applying controls.

Apply Controls - After the zone map is developed, apply pesticides or spot treatments (or other controls) based on zone prescription. This requires the use of GPS-guided application equipment. Application of controls must be based on economic thresholds and IPM program guidelines.

Pest Control Timing - Apply selected pest controls in a timely manner. This will ensure optimum control while maximizing environmental protection.

## YIELD MONITORING

Yield Map Development - Use a GPS-guided yield monitor to track field variations and make future adjustments of pest control applications. The data collected from the yield monitor is downloaded and

imported into an approved software package. Post processing of the yield data must be completed by range, equal count, or customized yield ranges. The counts or ranges of yield data are then used to develop yield maps with color-coded displays of the classes, ranges or counts of yield values within the fields. The development of accurate yield maps from the yield data requires an appropriate data interpolation method to be used. Different methods of data interpolation such as Kriging or nearest neighbor are incorporated into different manufacturer's software. It is important to make comparisons between yield maps produced by different data interpolation methods to determine the most accurate representation of the within and between field yield variations. A digital copy of yield data files and maps with summarized yield data should be included with the conservation plan.

Yield Map Interpretation - The GPS data from the pest scouting should be displayed on yield maps to aid with interpretation. Pest maps prepared from imagery and GPS data to set up the management zones should be compared with yield maps. It is important to first identify yield variability due to topographic features, natural fertility, equipment-induced or management-induced factors to properly interpret yield variability due to pest-induced factors. If available, additional GPS point data for other factors can also be used to aid in the interpretation of yield maps. Annual yield variation can be used as an additional layer when developing and modifying pest management zones.

Monitoring - Use a GPS-guided monitor to track field variations and make future adjustments of pest management strategies. Annual yield variation can be used as an additional layer when developing pest management zones.